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Magnesium Sulphate from Hydroxide or Carbonate

Experiment 9 - Practical Notes

Name: _____ Roll no.: _____ Date: _____

Aim

To prepare magnesium sulphate by either permitted starting-material route and compare their reaction behaviour.

Principle

Magnesium hydroxide or carbonate reacts with sulphuric acid to form magnesium sulphate. The carbonate route also releases carbon dioxide. The product hydrate and starting-material identity determine theoretical mass; basic hydrated magnesium carbonate is not automatically identical to pure MgCO_3 .

Requirements

- Prescribed magnesium hydroxide or carbonate with known composition.
- Dilute sulphuric acid, water, balance, stirring vessels, filtration and crystallisation equipment.

Procedure

1. Choose and identify the route

Record whether the starting solid is $\text{Mg}(\text{OH})_2$, MgCO_3 or a specified basic carbonate. Use its stated composition in calculations.

2. React gradually

Use the prescribed dilute-acid addition with stirring and temperature control. For carbonate, allow gas evolution to subside before the next addition; keep the vessel unsealed.

3. Check completion

Follow the prescribed endpoint and handle any excess undissolved material as directed. A single pH reading does not itself prove product purity.

4. Clarify and crystallise

Filter if required, then concentrate and cool under the specified conditions.

5. Collect and record

Separate, wash and surface-dry the intended hydrate. Record appearance and hydrate-basis yield.

Pharmaceutical Inorganic and Analytical Chemistry**Observations and Record**

Route	Reaction observation	Product record
Hydroxide	_____	_____
Carbonate	_____	_____
Crystals / hydrate	_____	____ g

Worked Example

The numbers below are illustrative; enter your own observations in the record.

- Hydroxide: $\text{Mg(OH)}_2 + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + 2 \text{H}_2\text{O}$. Carbonate: $\text{MgCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{CO}_2 + \text{H}_2\text{O}$.
- For an ideal 2.00 g Mg(OH)_2 portion, theoretical $\text{MgSO}_4 \cdot 7\text{H}_2\text{O} = 2.00 \times 246.47/58.32 \approx 8.45$ g.
- For 2.00 g pure MgCO_3 , theoretical heptahydrate = $2.00 \times 246.47/84.31 \approx 5.85$ g. A basic hydrated carbonate needs its own composition calculation.

Result

Starting material: _____. Product hydrate: _____. Recovered mass ____ g; theoretical mass ____ g; yield ____%.

Precautions

- Do not confuse carbonate grades or ignore water of crystallisation.
- Control gas evolution and avoid acid splashes.
- Do not strongly dry a hydrate while retaining its hydrated molecular mass in the yield calculation.

Viva Questions and Answers**1. Which route releases gas?**

The carbonate route releases carbon dioxide.

2. Why do equal starting masses give different theoretical yields?

The two starting compounds have different molar masses.

3. What must be stated for yield?

The limiting reactant and the product's hydrate basis.

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